

# BRIDGE DECK DESIGN CALCULATIONS

Date: 4/2/2014

## TERMS:

d= Dead-load deflection, inches.  
E= 29,500,000 psi  
Fs= Form stress, psi  
I = Moment of inertia, in<sup>4</sup> / ft of width  
L = Design span ft.  
S = Section modulus, in<sup>3</sup> / ft of width  
W = Total uniform load, psf  
Wd= Total uniform load - 55 psf construction load  
Max. Fs= 36,000 psi Grade 50&80 Steel; 29,000 psi Grade 40 Steel  
Max. d= L/180 or 1/2" which ever is less

## LOADING:

Weight of Slab = Design Slab x 12.5#/inch of slab  
Extra Concrete Valleys = xtra inches x 12#/inch of slab  
Construction load = 50 psf  
Form Weight = per form chosen

## DESIGN SPAN:

Girder spacing - flange width - 2"

## PROJECT:

Contractor: Schultz  
Structure: Bridge No. 19

State: VT  
County: Windsor

## DESIGN INFO:

Design Slab (in.): 9.00 C/C Girders (in.): 83.00 Flange Width (in.): 16.00

	C/C	Flange	2"	Design Span
Design Span:	83.00	16.00	2"	65.00

	Slab	12.5	55	Weight	Stress Load (W)	Deflection Load (Wd)
Loading:	9.00	12.5	55	1.89		

## Stress Calculation:

$$F_s = (1.5)(W)(L^2) / S$$

Fs	1.5	W	L^2	S
28672.79	1.5	169.39	29.34	0.260

## Deflection Calculation:

$$d = [(5)(Wd)(L^4) / 384 / E / I] * 1728$$

$$\text{Max. } d = L/180 \text{ or } \leq 1/2"$$

L/180  
0.361

d	5	Wd	L^4	384	1728	E	I
0.235	5	114.39	860.85	384	1728	29500000	0.319

## Weld Calculation:

Terms:

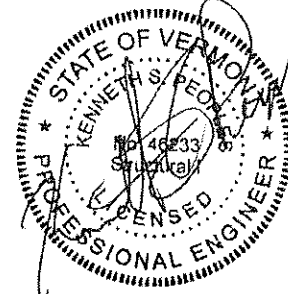
Fu = 55,000 psi Weld Yield  
Fv = .27 x 55,000 psi Allowable  
t = 1/8" Standard Weld Thickness  
L1 = 2" Weld Length (1 1/2" min. AASHTO)  
s = 15" Weld Spacing  
R = [(W)(s) / 12] \* (L / 2)

14850
0.125
2
15
573.46

$$L1 \text{ (min.)} = (\text{Sq. Root } [(R^2) + (2R)^2]) / (.707)(t)(Fv)$$

0.98
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Kenneth S. Peoples



Date: April 3, 2014

VT PROFESSIONAL ENGINEER  
NO. 46233

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**SUPPORT ANGLE DESIGN: (Grade 40 Steel)**

Yield Strength (Fy): 40,000 psi

Working Stress (0.725\*Fy): 29,000 psi

Gage: 12

Material Thickness (Ta): 0.1003

Moment Arm (e): 1" Min. Brg. - Material Thickness (Ta)

e: 0.8997

Design Length (D): C/C - Flange - 2(Ta)

D: 83.00 16.000 0.2006 66.7994

Load (P): (Ws)(D / 12 / 2)

P: 169.39 2.78 471.46

Moment (M): (P)(e)

M: 471.46 0.8997 424.18

Section Modulus (S): (12)(Ta^2) / 6

S: 12 0.01006 6 0.02012018

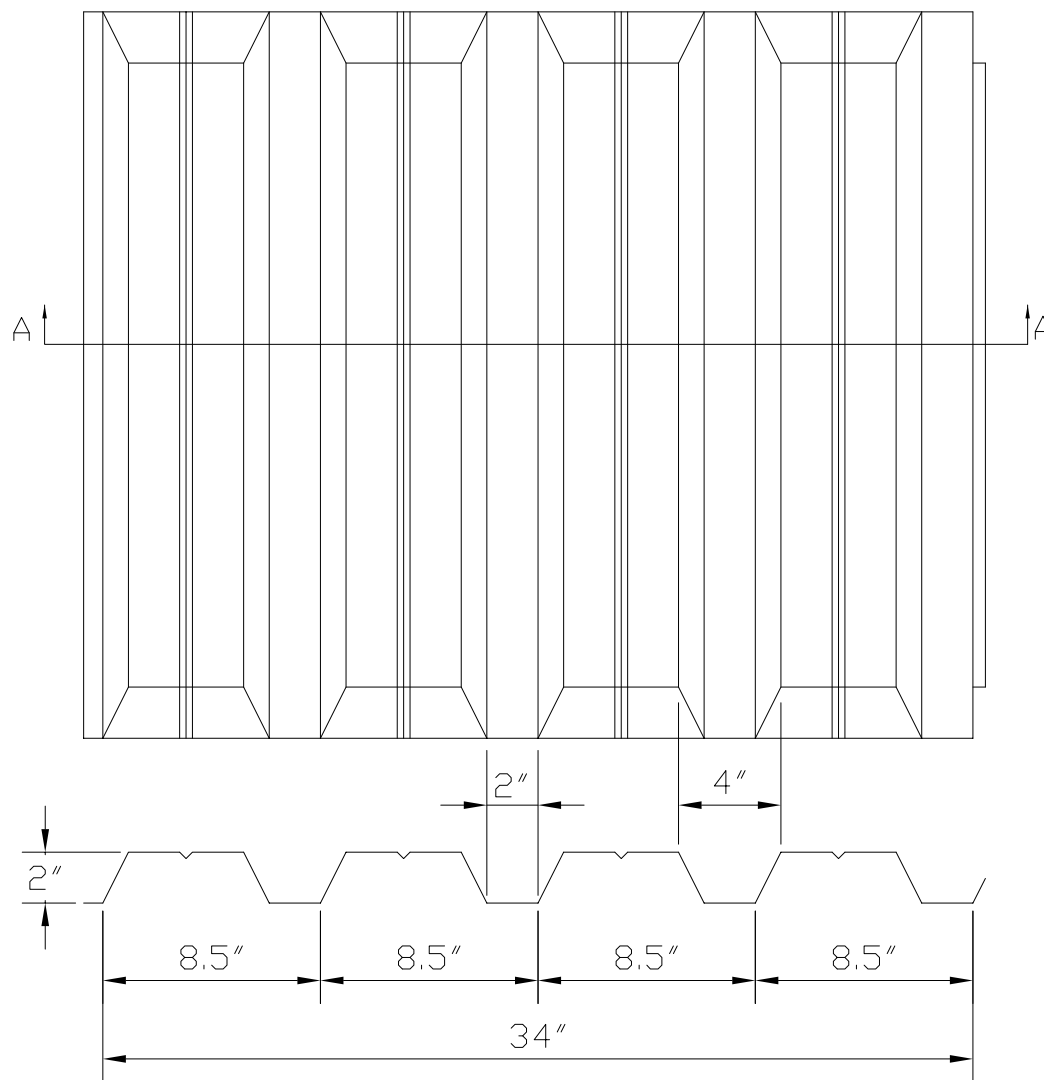
Actual Stress (As): M / S

As: 424.18 0.02012 21,082.15

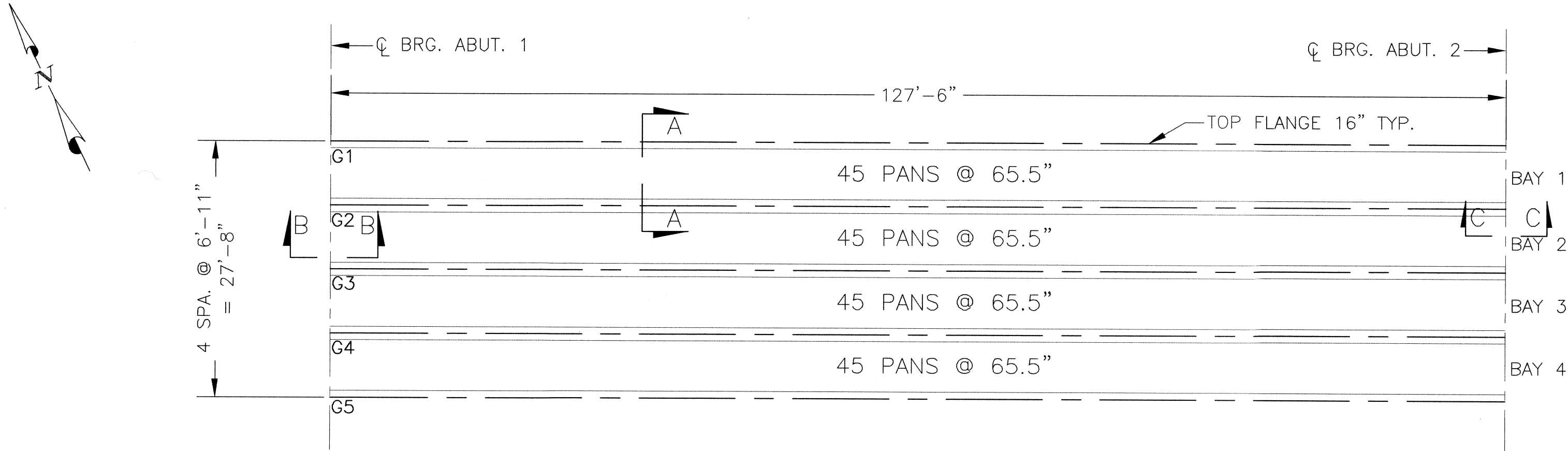
S.I.P., INC. OF DELAWARE  
 2204 CHESTNUT ST.,  
 GADSDEN, AL 35904  
 (256) 546-5858 FAX(256) 546-5859

FORM SIZE 2" X 8.5"  
 GALV. COATING : G-165

METAL THICKNESS IN INCHES	STRUCTURAL PROPERTIES I=IN <sup>4</sup> S=IN <sup>3</sup>	WEIGHT P.S.F.
22GA.	S= .260 I= .319	1.89
20GA.	S= .308 I= .385	2.22
.0359	S= .317 I= .396	2.31
.040	S= .357 I= .442	2.45
.045	S= .405 I= .498	2.77
.050	S= .450 I= .553	3.05
.055	S= .495 I= .609	3.31
.060	S= .539 I= .665	3.60
.065	S= .583 I= .721	3.89



SECTION "A-A"



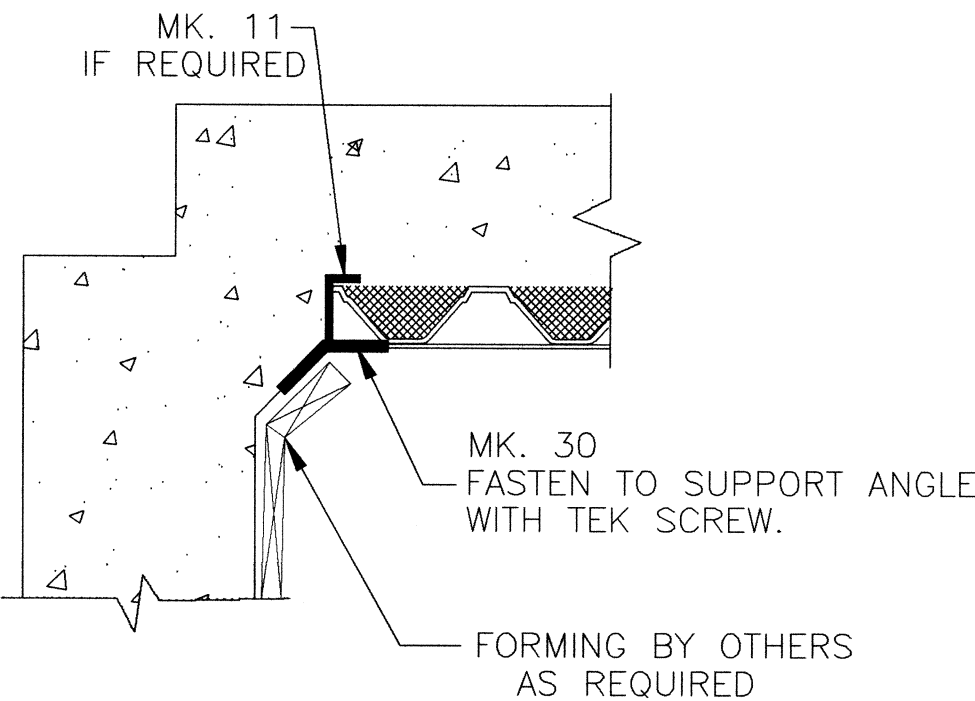
## BRIDGE DECK PLAN

SCALE 3/32" = 1'-0"

WARNING:  
EACH BRIDGE DECK FORM SHEET MUST  
BE FASTENED IMMEDIATELY UPON PLACEMENT  
TO AVOID HAZARD THAT CAN RESULT FROM  
LATERAL MOVEMENT OR SUDDEN UPLIFT.

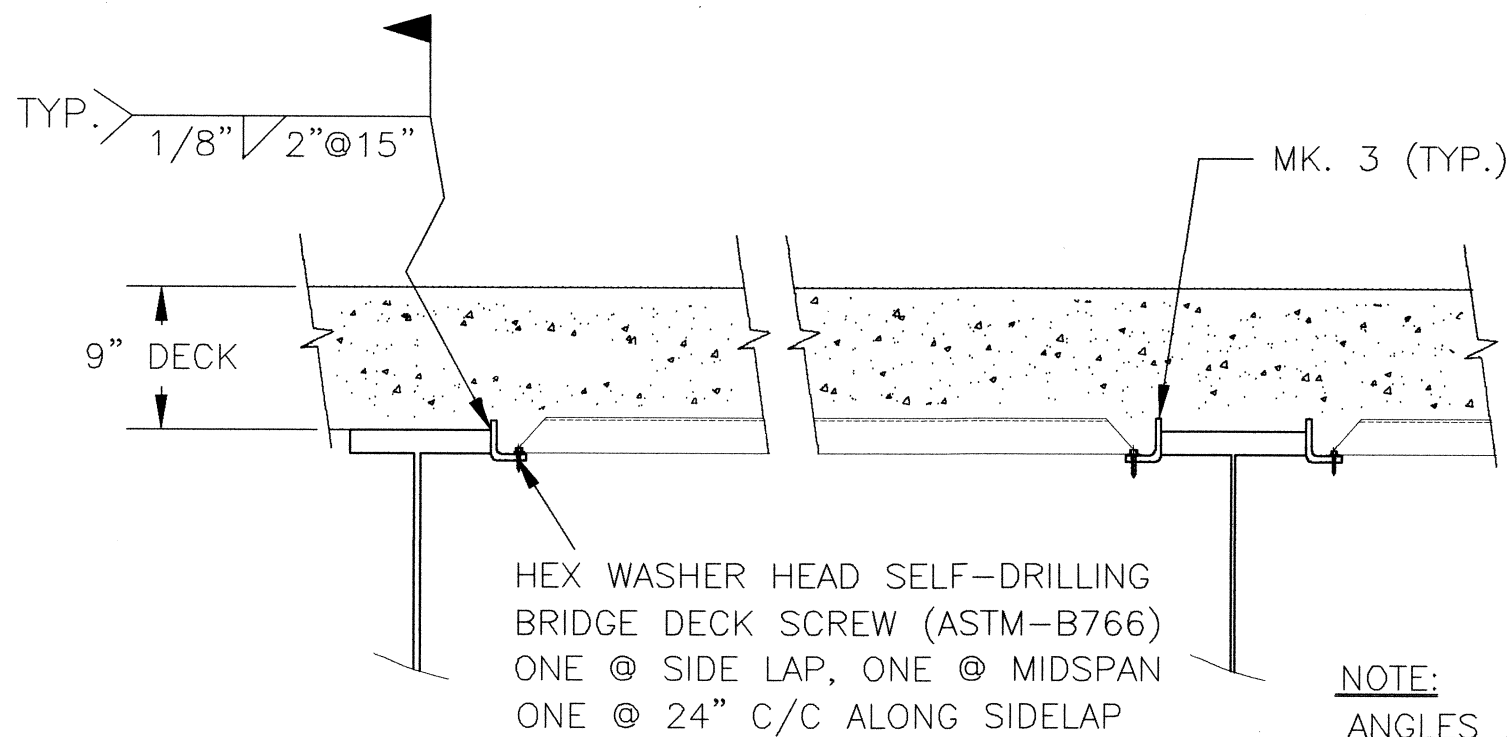
BRIDGE DECK MATERIAL LIST				
TYPE	GAGE	QTY.	LENGTH (IN.)	SQUARE
2" X 8.5"	22	180	65.5	27.84

SHEAR STUDS		
QTY.	DIAMETER	LENGTH
1030	7/8"	7"
1030	TOTAL STUDS	



## SECTION B-B

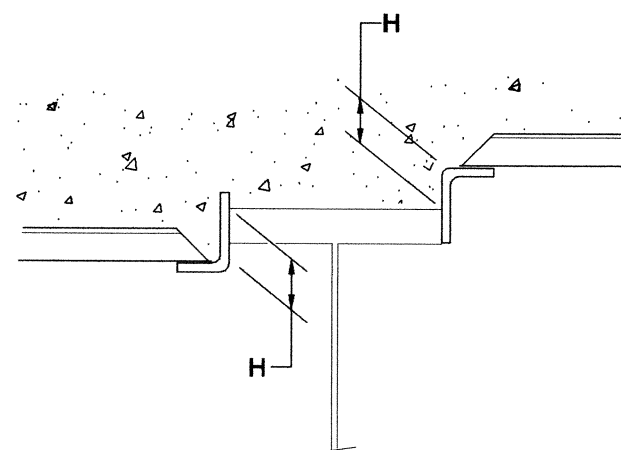
DETAIL AT ABUTMENT 1  
NO SCALE



## SECTION A-A

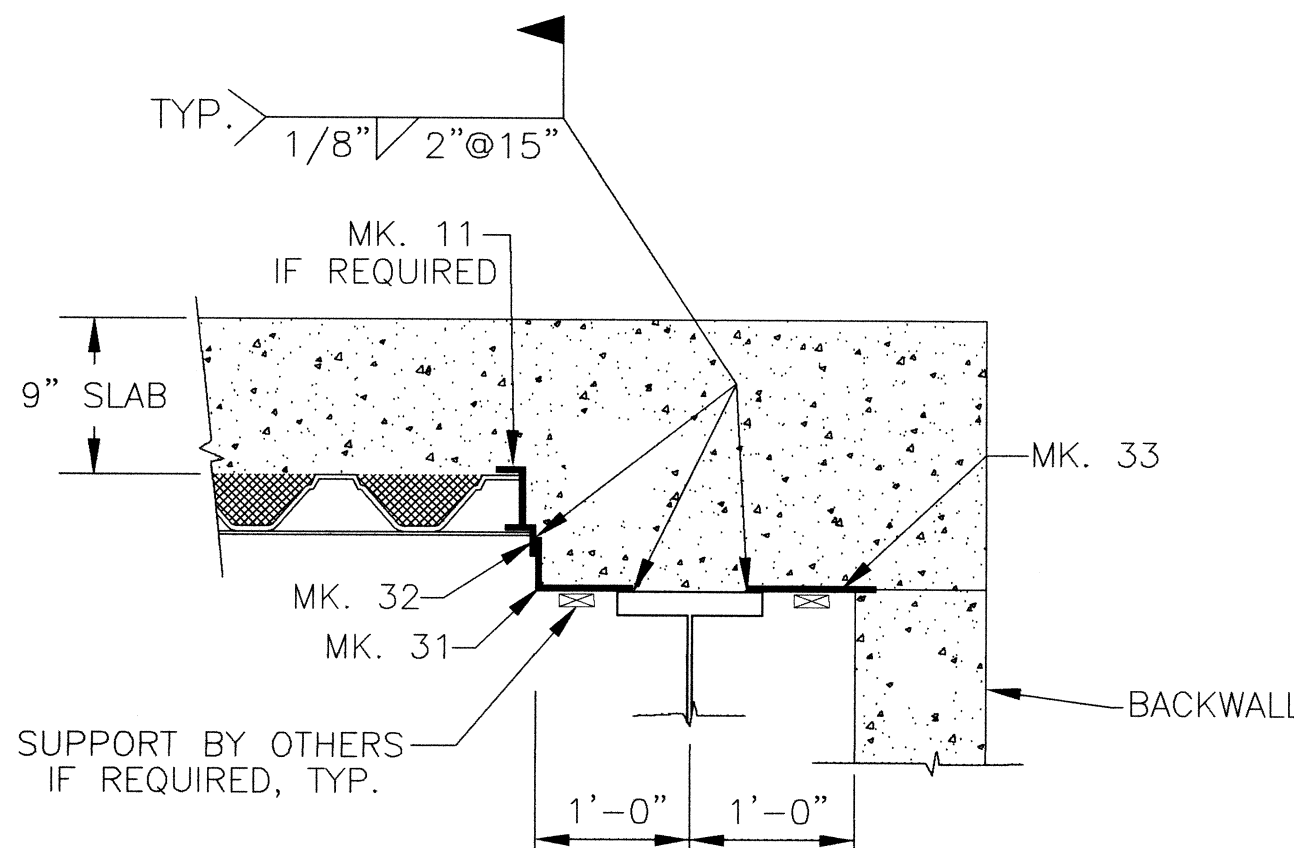
CONNECTION DETAIL  
NO SCALE

NOTE:  
ANGLES MAY BE USED IN  
THE "L" OR "7" POSITION  
AS REQUIRED.



CONTRACTOR SHALL SURVEY HAUNCH 'H' FROM TOP  
OF STRINGER FLANGE TO TOP OF ANGLE SEAT.  
THIS DISTANCE SHALL BE MARKED ON THE TOP  
FLANGE @ 12' INTERVALS ON EACH EDGE OF BEAM.

NO SCALE

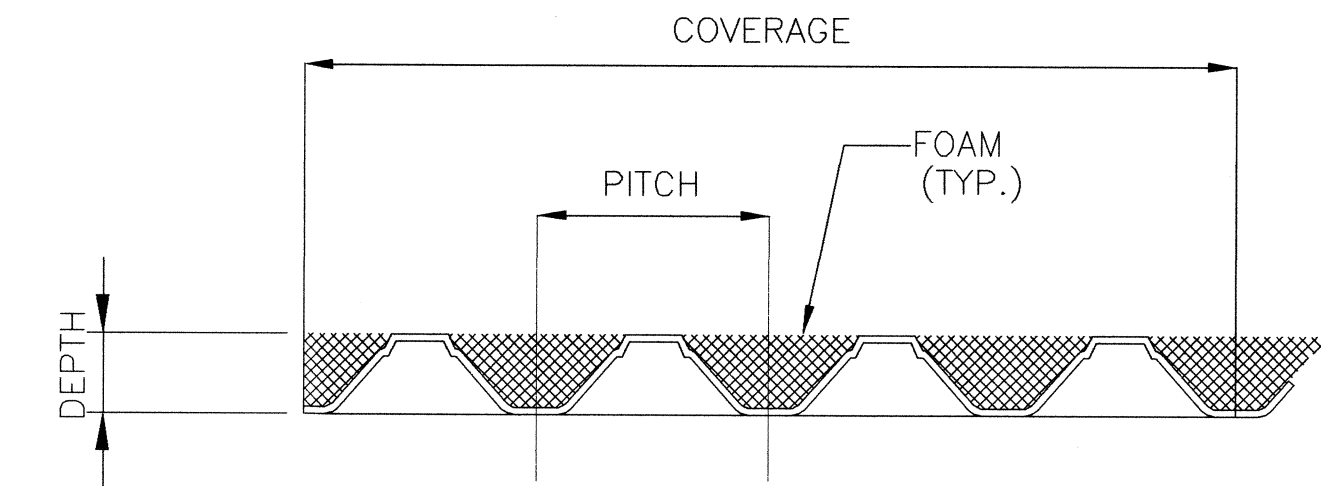


## SECTION C-C

DETAIL AT ABUTMENT 2  
NO SCALE

TRANSMITTAL RECORD		
1	4/3/14	APPROVAL
NO.	DATE	SENT FOR

BRIDGEDECK ACCESSORIES						
ACCESSORY QUANTITIES BASED ON LIN. FTG. REQUIRED. CUT-OFFS MUST BE UTILIZED.						
1,300 HEX WASHER HEAD SELF-DRILLING BRIDGE DECK SCREW (ASTM-B766)						
QTY.	GIRTH	LGTH.	MARK	DESCRIPTION	ANGLE	GAGE
88	5"	144"	3	3" X 2" SUPPORT ANGLE	90	12
4	3"	120"	11	2" X 1" CLOSURE ANGLE	90	20
4	6"	120"	30	3" X 3" END DAM	135	14
4	14"	120"	31	8" X 6" END DAM	90	14
4	7"	120"	32	4" X 3" END DAM	90	14
4	10"	120"	33	10" FLAT END DAM	---	14



## BRIDGE DECK SECTION

DEPTH	PITCH	COVERAGE	GAGE	I	S
2"	8.5"	34"	22	.319 in <sup>3</sup> /ft.	.260 in <sup>3</sup> /ft.

### DESIGN NOTES:

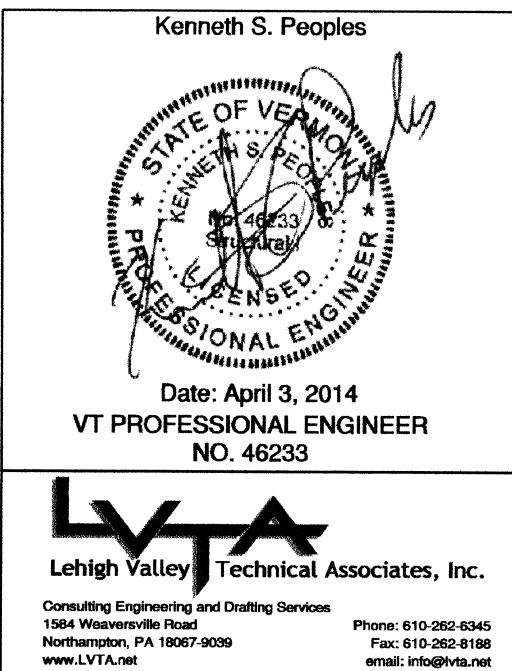
- MATERIAL IS PRODUCED BY: S.I.P., INC. OF DELAWARE, 2204 CHESTNUT ST., GADSDEN, AL 35904, PHONE (256) 546-5858.
- BRIDGE DECK FORM AND ACCESSORIES SHALL CONFORM TO ASTM A653/A653M WITH COATING DESIGNATION G185, AND GRADES LISTED:  
DECK FORMS GA 22 = GRADE 80  
ALL ACCESSORIES = GRADE 40  
FABRICATION SHALL BE IN CONFORMANCE WITH ASTM A924/A924M.  
CALVANIZED COATING CONFORMS TO LATEST REVISION OF ASTM SPECIFICATION A924M COATING CLASS G165.
- ALL FASTENERS TO BE .0005 CADMIUM PLATED COATINGS.
- ALL FORMS AND THEIR SUPPORTS HAVE BEEN DESIGNED TO CARRY THE DECK CONCRETE PLUS 55psf FOR CONSTRUCTION LOADS.
- ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2011 EDITION OF THE VERMONT AGENCY OF TRANSPORTATION SPECIFICATIONS

### ERECTION NOTES:

- BRIDGE DECK FORM AND ACCESSORY MATERIALS NOT PROMPTLY ERECTED SHALL BE STORED OFF THE GROUND WITH ONE END ELEVATED FOR DRAINAGE.
- GENERAL CONTRACTOR SHALL TAKE GRADES ON BOTH SIDES OF BEAMS AT A MAXIMUM OF 12'-0" INTERVALS SO THAT DECK ERECTOR CAN ADJUST ELEVATION OF SUPPORTS TO FOLLOW FINISHED ROADWAY PROFILE (PLUS OR MINUS 1/4").
- PRIOR TO PLACEMENT OF FORMS, THE ENGINEER OR CONTRACTOR SHALL ADVISE ERECTOR OF DIRECTION OF POUR. ERECTOR WILL PLACE FORM SHEETS IN OPPOSITE DIRECTION TO MINIMIZE DIFFERENTIAL DEFLECTION.
- SHEETS SHALL BEAR A MINIMUM OF 1" ON SUPPORTS.
- EACH SHEET MUST BE FASTENED TO SUPPORTS IMMEDIATELY UPON PLACEMENT TO AVOID HAZARD THAT COULD RESULT FROM HORIZONTAL MOVEMENT OR SUDDEN UPLIFT.
- ALL CUTTING OF FORM SHEETS AND ACCESSORY ITEMS SHALL BE DONE BY SAW, SHEAR OR OTHER APPROVED METHODS.
- CAULKING OR TAPING, IF REQUIRED, IS TO BE BY OTHERS.
- CLOSURE/END DAM MATERIALS ARE NOT SELF-SUPPORTING. ANY ADDITIONAL SUPPORT IS TO BE BY OTHERS.
- ALL CUTTING, FORMING AND SHORING OF DECK PANS AT SCUPPERS/DRAIN PIPES IS TO BE BY OTHERS.

### MISCELLANEOUS NOTES:

- THE GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS.
- CARE SHALL BE TAKEN TO AVOID DAMAGING THE INSTALLED FORM FROM EITHER STACKING OF MATERIALS, DROPPING EQUIPMENT OR HEAVY CONSTRUCTION TRAFFIC. DAMAGED FORMS TO BE REPLACED BY GENERAL CONTRACTOR, AS DIRECTED BY ENGINEER AT NO ADDITIONAL COST TO CITY/STATE.
- ANY ADDITIONAL CONCRETE REQUIRED DUE TO USE OF FORMS SHALL BE AT THE GENERAL CONTRACTOR'S EXPENSE.
- CALCIUM CHLORIDE (OR ANY ADMIXTURE CONTAINING SALTS) SHALL NOT BE USED IN THE CONCRETE PLACED ON THE FORMS.
- ERECTION OF FORMS SHALL BE DONE UNDER DIRECT SUPERVISION OF A FOREMAN SPECIALLY TRAINED FOR THIS TYPE OF WORK.
- DO NOT DROP CONCRETE FROM A HEIGHT GREATER THAN 10" ABOVE THE FORMS.



RECORD OF REVISIONS		
REV.	DATE	DESCRIPTION

OWNER: STATE OF VERMONT AGENCY OF TRANSPORTATION			
CONTRACTOR: SCHULTZ CONSTRUCTION, INC.			
PROJECT: VT ROUTE 73 (RURAL MAJOR COLLECTOR) BRIDGE NO. 19			
LOCATION: ROCHESTER, WINDSOR CO., VT			
J&B WELDING, INC. 409 HERCULES DRIVE STOCKERTOWN, PA. 18083 (610) 813-2577 FAX. (610) 813-2578			
DATE: 4/1/14	APPROVED BY: JJJ	CHECKED BY: JJJ	DRAWN BY: CML
SCALE: 3/32" = 1'	J&B JOB No:	1384	
PG. 1 OF 1	PROJECT No:	ER BRF 0162(18)	